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Bremen, 16 February 2004

Our Ref.: MA 7452-01WO STK/cmu
Direct Dial: 0421/36 35 694Applicant: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
Serial Number: PCT/JP03/03140In response to the Written Opinion dated 14 January 2004.

It is herewith forwarded:

- new claims 1 to 21 which shall – without prejudice – replace all previous claims.

1. Amendments

- 1.1 New claim 1 is a combination of previous claims 1 and 2. New claims 2 to 6 correspond to previous claims 3 to 7. New claims 7 to 16 correspond to previous claims 11 to 20. New claim 17 has been inserted referring to a network control framework method corresponding to the apparatus as claimed in new claim 1. New claims 18 to 20 correspond to previous claims 8 to 10. New claim 21 has been added referring to a communications network.

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- 1.2 New claims 1 to 16 now refer to a network control framework apparatus. New claims 17 to 20 now refer to a network control framework method. New claim 21 refers to a communications network.

The new set of claims thus only has one independent apparatus claim, one independent method claim and one independent network claim. All previous claims referring to a data format have been formulated as dependent apparatus claims. All previously independent method claims are now dependent claims of new independent method claim 17.

- 1.3 The term "a single or plural number of" has been amended into "at least one".
- 1.4 Recitations of claims in other claims by use of expressions such as "as recited in claim..." have been avoided as much as possible. We replaced those recitations by other expressions, such as "a predetermined data format" or "a signature in a predetermined data format".
- 1.5 The expression "known as" has been replaced by "referred to as".
- 1.6 The claim language of several claims has been revised in order to better reflect that they refer to an apparatus or method, respectively.
- 1.7 Claim 21 has been added in order to extend the scope of protection also to a complete network comprising one or more network control framework apparatuses as claimed in claim 1.

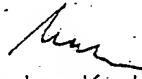
2. As to unity of invention

The new independent claims 1, 17 and 21 are all based on the same inventive concept of using a means or a step for distribution of the rule specification to at least one intermediate network element as defined in feature e) of new claims 1 and 17. All other previously independent claims have been transformed into dependent claims. The requirement of unity of invention is thus fulfilled.

3. As to novelty and inventive step

The subject matter of the new independent claims including in particular a means or a step for distribution of the rule specification to at least one intermediate network element comprising means or steps as defined in feature e) of the independent claims 1 and 17 is to our opinion novel and involves an inventive step.

We kindly ask the Examiner now to carry out a detailed substantive Examination and to issue a detailed Written opinion before issuing the International Preliminary Examination Report thus giving the applicant a further opportunity for response.


(Stephan Keck)
Association No. 15

Ends.:
New claims 1 to 21

NEW CLAIMS

1. A network control framework apparatus for controlling resources at an intermediate network element connecting two or 5 more communications networks comprising: ~~of the following entities~~

a) ⁽¹⁰¹⁾ ~~a~~ the gateway module providing gateway functionality,

b) ⁽¹⁰²⁾ ~~a~~ the rule engine module to perform network resource control decision based on specified rules, wherein the 10 rules are specified in a rule specification format referred to hereafter ~~known~~ as a Rule Specification,

c) ^{(103), et al.} ~~at least one~~ a single or plural number of special package add-on to the rule engine module ~~where a said special package offers~~ ^{ing} specialized functionality to the rule engine module, ~~and~~

d) ⁽¹⁰⁴⁾ ~~a~~ the rule injection module to inject or remove Rule Specification to or from the rule engine module, ~~and~~

2. e) ⁽¹⁰⁵⁾ ~~a~~ means for distribution of Rule Specification ~~as recited in claim 1 to a single or plural number of intermediate network elements as recited in claim 1~~ comprising of ^{said} ~~at least one~~ ^{means for distribution of} i. ~~the~~ the indications in the Rule Specification to indicate part or whole of the Rule Specification is to be distributed, ^{that} ii. ~~means for distribution of a~~ the signature embedded into data packets to announce the capabilities of the intermediate network elements the data packet traversed,

- means for*
- iii. ~~the method of~~ parsing the Rule Specification to determine if part or whole of the specified Rule Specification is distributed,
- means for*
- iv. ~~the method of~~ identifying the target network element to distribute part or whole of a Rule Specification,
- means for distribution of a*
- v. ~~the~~ signaling embedded into data packets to inform target network element of the distribution of part or whole of Rule Specification,
- means for*
- vi. ~~the~~ retrieval of the part or whole of Rule Specification distributed to the target network element from the intermediate network element that distributes the part or whole of Rule Specification.
2. The apparatus as recited in claim 1, wherein the
3. A format of indications of part or whole of Rule
- 15 Specification for distribution ~~as recited in claim 2 to a single or plural number of intermediate network element as recited in claim 1, comprises of~~
- i. the specification of the direction of distribution by specifying the endpoint of the specified direction,
- 20 ii. the specification of the number of intermediate network elements towards the specified endpoint,
- iii. the specification of the number of intermediate network elements from the specified endpoint, and/or
- 25 iv. the specific content distributed at the intermediate network elements.

3. The apparatus as recited in claim 1, wherein the
 4. A format of signature embedded into single or plural
number of data packets as recited in claim 2 to announce the
capabilities of the intermediate network elements as recited in
 5. claim 1 the data packets traversed, comprises of
- i. the identification of the intermediate network element the
 signature belongs to,
 - ii. the special packages ~~as recited in claim 1~~ that are
 installed on the intermediate network element the
 signature belongs to, and
 - iii. the capability of accepting or generating part or whole of
 a Rule Specifications for distribution.
4. The apparatus
5. ~~A means for intermediate network elements as recited in~~
 15. ~~claim 1 to store the signatures embedded in single or plural~~
~~number of data packets as recited in claim 2 or 4~~ ^{1 or 3} wherein the
 signatures of the intermediate network elements that the data
 packets traversed are stored with the starting and ending points
 between which the data packets traversed in the order of which
 20. the data packets traversed and the transmission protocol the
 data packets belongs to.
5. ~~apparatus~~
6. ~~The data format used to store the signature of~~
 intermediate network element as recited in claim 1, ³ ~~2 or 4~~ or ⁴
 25. ~~wherein the format of said signature comprises~~
~~containing the identification of the intermediate network~~

at least one element and the installed special packages ~~as recited in claim~~ at the intermediate network element.

6. The apparatus as recited in claims 1, 3, 4 or 5, wherein the data format used to store ~~the signatures for the said~~

intermediate network elements as recited in claim 1, 2, 4, or 5 that a single or plural number of data packets flowing from one endpoint to another traverses, containing comprises

i. the identification of the ending point that the data packets flow to,

10 ii. the identification of the starting point that the data packets flow from,

iii. the transmission protocol the data packets belongs to,

iv. the array of signatures of the intermediate network elements in the order of the data packets traverse from the intermediate network element where the data format is stored to the ending point, and

v. the number of signatures of the intermediate network elements in the order of the data packets traverse from the intermediate network element where the data format is stored to the ending point.

- 15 i. The apparatus as recited in any of the preceding claims,
ii. ~~A format of signalling to signal the intermediate network~~
~~further comprising means for~~
~~element as recited in claim 1 to express the desire to distribute~~
~~collection of a single or plural number of rules in a Rule~~
~~Specification to the intermediate network element~~ ^{comprising} ~~consisting of~~
- 20 i. the identification of the intermediate network element
where the collection of ~~single or plural number of rules~~
in a Rule Specification is distributed to,
ii. the identification of the intermediate network element
where the collection of ~~single or plural number of rules~~ ^{the at least one}
in a Rule Specification is distributed from, and

the at least one

iii. the identification of the collection of ~~single or plural~~
~~number of rules~~ in a Rule Specification.

8. The apparatus as recited in any of the preceding claims,
12. ~~further comprising a~~ means of retrieving the collection of ~~single or plural~~

5. ~~number of rules~~ in a Rule Specification from the intermediate
network element ~~as recited in claim 1~~ that distributes the
collection of rules by the intermediate network element where
the collection of rules is distributed to, comprises ^{ing} of

~~means for establishing~~

i. ~~the establishment of~~ a communication channel between

10. the intermediate network element where the collection
of rules is distributed to and the intermediate network
element where the collection of rules is distributed from,
~~means for providing~~

ii. ~~the provision of~~ the identification of the collection of rules

that is distributed ~~as recited in claim 11~~ via the
communications channel by the intermediate network
element where the collection of rules is distributed to,

and

~~means for transmitting~~

iii. ~~the transmission of~~ the collection of rules that is
distributed via the communications channel by the
intermediate network element where the collection of
rules is distributed from.

9. The apparatus as recited in any of the preceding claims,

13. ~~A network control framework apparatus for controlling~~
~~resources at an intermediate network element connecting two or~~

25. ~~more communications networks~~, wherein an endpoint node

referred to

hereafter known as a client node sends a request to the other

referred to at least one endpoint node hereafter known as a server node, via a single or plural number of the intermediaries, and the server node

accepts the request with an appropriate response, and a

5 communications channel is set up between the server ~~content~~ node and the client node through the intermediaries, and the server node starts transmitting data packets through the communications channel to the client node until the client node sends a request, via the intermediaries, to tear down the

10 communications channel, and the client node may transmit information about the transmission statistics back to the server node. ~~comprises of the following entities:~~

- i. the gateway module providing gateway functionality,
- ii. the rule engine module to perform network resource control decision based on specified rules, wherein the rules are specified in a rule specification format hereafter known as a Rule Specification,
- iii. a single or plural number of special package add on to the rule engine module where a said special package offers specialized functionality to the rule engine module, and
- iv. the rule injection module to inject or remove Rule Specification to or from the rule engine module.

10. The apparatus as recited in claim 9,

further comprising a means of providing the author of Rule Specification as

25 recited in claim 13 to trigger a singular or plurality of rules at a

intermediate network element ~~as recited in claim 13~~ based on the following control methods.

- i. the rule to be evaluated when the intermediate network element received a request packet from the client node to the server node;
- 5 ii. the rule to be evaluated when the intermediate network element received a response packet from the server node to the client node;
- 10 iii. the rule to be evaluated when the intermediate network element received a data packet containing contents sent by the server node to the client node through the communications channel established between the server node and the client node;
- 15 iv. the rule to be evaluated when the intermediate network element received a data packet containing the transmission statistics from the client node to the server node;
- 20 v. the rule to be evaluated when the intermediate network element received a specified number of data packets containing contents sent by the server node to the client node through the communications channel established between the server node and the client node, and
- 25 vi. the rule to be evaluated when the intermediate network element received a data packet containing contents

sent by the server node to the client node through the communications channel established between the server node and the client node after the elapse of a recurrent timer of a specified timer value.

- 5 11. The apparatus as recited in any of the preceding claims, wherein
- 10 12. A set of parameters used in the Rule Specification ~~is~~ ^{at least one} recited in claim 1 to control ~~a single or plural number of~~ content or content delivery sessions to achieve device independence in the delivery of said content, ~~consisting of~~ ^{comprising}
- 15 i. the set of User Preference parameters consisting of the preferences of the human user consuming the content;
- 20 ii. the set of Agent Capabilities parameters consisting of the capabilities of the software agent employed by the human user to retrieve the content;
- 25 iii. the set of Device Capabilities parameters consisting of the capabilities of the hardware employed by the human user to retrieve the content, and
- 30 iv. the set Natural Environment parameters consisting of the information about the environment in which the human user retrieves the content.
- 35 12. The apparatus as recited in claim 13, wherein
- 40 13. The set of User Preference parameters ~~is~~ recited in claim 16 ~~consisting of~~ comprises
- 45 i. the human user's preferences on the method of retrieving the content,

- ii. the human user's preferences on the language used in the retrieved contents,
- iii. the human user's preferences on the presentation of the retrieved content,
- 5 iv. the age group of the human user retrieving the content,
- v. the gender of the human user retrieving the content, and
- vi. the employment status of the human user retrieving the content.

10 13. The apparatus as recited in claim 11, wherein
17. the set of Agent Capabilities parameters ~~as recited in~~
~~claim 15 consisting of Comprises~~

- i. the type of software agent employed by the human user to retrieve the content;
- ii. the content formats supported by the software agent employed by the human user to retrieve the content,
- 15 iii. the content languages supported by the software agent employed by the human user to retrieve the content, and
- iv. the transmission protocols supported by the software agent employed by the human user to retrieve the content.

20 14. The apparatus as recited in claim 16, wherein
18. the set of Device capabilities parameters ~~as recited in~~
~~claim 15 consisting of Comprises~~

- 25 i. the type of hardware employed by the human user to

retrieve the content,

ii. the processor speed and processor family of the hardware employed by the human user to retrieve the content,

iii. the memory capacity of the physical and secondary storage of the hardware employed by the human user to retrieve the content,

iv. the display depth and resolution of the hardware employed by the human user to retrieve the content, and

v. the operating system running on the hardware employed by the human user to retrieve the content.

15. The apparatus as recited in claim 11, wherein

16. the set of Natural Environment parameters ~~as recited in~~
~~claim 15 consisting of / comprising~~

i. the information of the location where the human user is retrieving the content,

15. ii. the information of the mobility of the human user retrieving the content, and

iii. the information of the illuminations conditions in which the human user is retrieving the content.

20. 16. The apparatus as recited in any of claims 11 to 14, wherein

17. the special packages ~~installed to the intermediate~~
~~at least one~~ ~~is~~
~~network element as recited in claim 11 capable of interpreting~~
~~and evaluating Rule Specification that are constructed using~~
~~the sets of parameters as recited in claim 15, 16, 17, or 18~~

17
 A network control framework ~~apparatus~~ for controlling resources at an intermediate network element connecting two or more communications networks comprising ~~of the following entities:~~ ^{method}

- a) ~~the gateway module providing gateway functionality,~~ ^{from} ~~by a gateway module~~
 - b) ~~the rule engine module to perform~~ ^{ing} ~~network resource control decision based on specified rules, wherein the~~ ^{by a rule engine module}
 - c) ~~a single or plural number of special package add on to the rule engine module where a said special package offers~~ ^{(103) ed} ~~by at least one special package added on to the rule engine module and rule engine~~
 - d) ~~the rule injection module to inject~~ ^{ing} ~~or remove Rule Specification to or from the rule engine module~~ ^{by a rule injection module, and}
 - e) ~~A means for distribution of Rule Specification as recited in claim 1 to a single or plural number of intermediate network elements~~ ^{at least one said}
- 20 elements is recited in claim 1 comprises ^{ing} ~~of the steps of~~ ^{that}
- i. ~~means for distribution of~~ ^{the indications in the Rule Specification to indicate} part or whole of the Rule Specification is to be distributed,
 - ii. ~~means for distribution of a~~ ^{the signature embedded into data packets to announce the} capabilities of the intermediate network elements the data packet traversed,

means for

iii. the method of parsing the Rule Specification to determine if part or whole of the specified Rule Specification is distributed,

means for

iv. the method of identifying the target network element to distribute part or whole of a Rule Specification,

means for distribution of a

v. the signaling embedded into data packets to inform target network element of the distribution of part or whole of Rule Specification,

means for

vi. the retrieval of the part or whole of Rule Specification distributed to the target network element from the intermediate network element that distributes the part or whole of Rule Specification.

3. The apparatus as recited in claim 2, wherein the

2. A format of indications of part or whole of Rule
said

15. Specification for distribution as recited in claim 2 to a single or plural number of intermediate network element as recited in claim 1, comprises of

i. the specification of the direction of distribution by specifying the endpoint of the specified direction,

20. ii. the specification of the number of intermediate network elements towards the specified endpoint,

iii. the specification of the number of intermediate network elements from the specified endpoint, and/or

iv. the specific content distributed at the intermediate network elements.

18. The method as recited in claim 17, further comprising a step
8. ~~A method~~ of extracting the signature of intermediate
network elements embedded in ~~single or plural number of~~ data
packets ~~as recited in claim 1, 2, 4 or 5~~ to be stored in the data
format as recited in claim 7, comprising the steps of

- i. checking if there are embedded signatures in the data packets,
- ii. checking if there exist a data format ~~as recited in claim 7~~ ^{signature in a predetermined} that is previously stored having the same starting and ending points and transmission protocol;
- iii. allocating a new data format when there is no data format that is previously stored having the same starting and ending points and transmission protocol;
- iv. purging data stored in the data format that previously existed having the same starting point, ending point and transmission protocol;
- v. preparing an empty last-in-first-out data structure;
- vi. extracting each embedded signature in the data packet and pushing it to the last-in-first-out data structure;
- vii. removing each element in the last-in-first-out data structure and recording it to the ^{predetermined} data format ~~as recited in claim 7~~, and
- viii. recording the number of embedded signature extracted ^{predetermined} in the data format ~~as recited in claim 7~~

20 19. The method as recited in one of claims 77 or 18, further comprising
21. ^{a step} ~~A method~~ of parsing the Rule Specification ~~as recited in~~ ^{ing}
~~claim 2~~ to determine if part or whole of the Rule Specification
is to be distributed comprises the steps of
22. i. checking each rule in the Rule Specification for
23. syntactical validity,

- 54
44
- ii. rejecting the rule if there is syntactical errors,
 - iii. checking the rule for ~~the~~ distribution indication ~~as recited~~
~~in claim 3~~,
 - iv. evaluating the rule locally if there exist no distribution indication,
 - v. determining the remote intermediate network element to distribute the rule to,
 - vi. evaluating the rule locally if no suitable remote intermediate network element to distribute the rule to can be found,
 - vii. checking if the remote intermediate network element contains the special package or special packages required in the rule,
 - viii. evaluating the rule locally if the remote intermediate network element do not have the required special package or special packages, and
 - ix. distributing the rule to the remote intermediate network element.

20 - 10. A method of determining the remote intermediate network element that a rule is to be distributed to ~~as recited in claim 9~~, given ~~the~~ ^{a predetermined} distribution indication ~~as recited in claim 3~~, comprising the steps of

- i. ~~the method of~~ locating ~~the~~ data format ~~as recited in claim 7~~ with the matching starting point, ending point and

transmission protocol,

ii. declaring no suitable remote intermediate network element
~~as recited in claim 7~~ if no data format ^{as recited in claim 7} can be located,

iii. setting ~~the~~ a temporary variable to the specified number
5 of the intermediaries towards or from the specified endpoint
in the given distribution indication,

iv. setting the temporary variable to the value of the number
of intermediaries ^{as recited in claim 7} given in the located data format ~~as~~
~~recited in claim 7~~ if the specified number of the
intermediaries ^{to network elements} towards or from the specified endpoint in
10 the given distribution indication is greater than the
number of intermediaries ^{to network elements} towards or from the specified
ending point in the given distribution indication;

v. whereas the specified distribution indication ~~as recited in~~
15 ~~claim 3~~ consists of the specification of the ending point
and the specification of the number of intermediate
network elements towards the specified ending point,
set the temporary variable to a value equals the number
of intermediaries ^{to network elements} given in the located data format ~~as~~
~~recited in claim 7~~ minus the original value in the
20 temporary variable,

vi. whereas the specified distribution indication ~~as recited in~~
25 ~~claim 3~~ consists of the specification of the ending point
and the specification of the number of intermediate
network elements from the specified ending point, set

the temporary variable to a value equals the original value in the temporary variable minus 1,

vii. declaring the remote intermediate network element to be the network element specified in a signature stored in the located data format ~~as recited in claim 7~~ where the signature has an index in the array of signatures in the located data format ~~as recited in claim 7~~ equals to the value stored in the temporary variable should such an index ~~exist~~ exists, and

10 viii. declaring no suitable remote intermediate network element should the index equal to the value stored in the temporary variable does not exist in the array of signatures in the located data format ~~as recited in claim 7~~

as recited in any of claims
1 to 16

21. A communications network comprising at network control function apparatus for controlling resources at an intermediate network element connecting two or more communications networks.

(11)

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Bremen, 23 March 2004
Our Ref.: MA 7452-01WO STK/cmu
Direct Dial: 0421/36 35 694

Applicant: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
Serial Number: PCT/JP03/03140

In response to the brief telephone conference of 3 March 2004
held with the Examiner

It is herewith forwarded a new claim 20 which shall replace – without prejudice – previous claim 20. New claim 20 has been transformed into a dependent claim of claim 17.

The Examiner is now kindly asked to start substantive Examination of the present application.


(Stephan Keck)
Association No. 15

Encls.:
New claim 20

iii. rejecting the rule if there is syntactical errors,

iii. checking the rule for ~~the~~ distribution indication ~~as recited~~
~~in claim 3~~,

iv. evaluating the rule locally if there exist no distribution
5 indication,

v. determining the remote intermediate network element to
distribute the rule to,

vi. evaluating the rule locally if no suitable remote
10 intermediate network element to distribute the rule to
can be found,

vii. checking if the remote intermediate network element
contains the special package or special packages
required in the rule;

viii. evaluating the rule locally if the remote intermediate
15 network element do not have the required special
package or special packages; and

ix. distributing the rule to the remote intermediate network
element.

20. ~~10. The method as recited in claim 7, further comprising~~

~~a method of determining the remote intermediate network
element that a rule is to be distributed to ~~as recited in claim 9~~~~

~~given ~~the~~ distribution indication ~~as recited in claim 3~~~~

~~comprises the steps of~~

~~a signature in a predetermined~~

i. ~~the method of~~ locating ~~the~~ data format ~~as recited in claim~~

25 ~~7~~ with the matching starting point, ending point and

transmission protocol,

ii. declaring no suitable remote intermediate network element
~~/ predetermined~~

if no data format ~~as recited in claim 7~~ can be located,

iii. setting ~~(the)~~ a temporary variable to the specified number

5 of the intermediaries towards or from the specified
endpoint in the given distribution indication,

iv. setting the temporary variable to the value of the number
~~/ predetermined~~

of intermediaries as given in the located data format ~~as~~

~~recited in claim 7~~ if the specified number of the

~~to network elements~~

intermediaries ~~towards or from the specified endpoint in~~

the given distribution indication is greater than the

~~to network elements~~

number of intermediaries ~~towards or from the specified~~

ending point in the given distribution indication,

v. whereas the specified distribution indication ~~as recited in~~

15 ~~claim 3~~ consists of the specification of the ending point

and the specification of the number of intermediate

network elements towards the specified ending point,

set the temporary variable to a value equals the number

~~to network elements~~ ~~/ predetermined~~

of intermediaries ~~given in the located data format ~~as~~~~

~~recited in claim 1~~ minus the original value in the

temporary variable,

vi. whereas the specified distribution indication ~~as recited in~~

20 ~~claim 3~~ consists of the specification of the ending point

and the specification of the number of intermediate

network elements from the specified ending point, set

the temporary variable to a value equals the original value in the temporary variable minus 1;

- vii. declaring the remote intermediate network element to be the network element specified in a signature stored in the located data format ~~as recited in claim 7~~ where the signature has an index in the array of signatures in the located data format ~~as recited in claim 7~~ equals to the value stored in the temporary variable should such an index exist, and
- 10 viii. declaring no suitable remote intermediate network element should the index equal to the value stored in the temporary variable does not exist in the array of signatures in the located data format ~~as recited in claim 7~~

~~as recited in any of claims
1 to 16~~

21. A communications network comprising at least one control framework apparatus for controlling resources at an intermediate network element connecting two or more communications networks.

(20)

Europäisches Patentamt

80298 München

Bremen, 18 June 2004

Our Ref.: MA 7452-01WO STK/cmu
Direct Dial: 0421/36 35 694

Applicant: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
Serial Number: PCT/JP03/03140

In response to the Written Opinion dated 13 April 2004

It is herewith forwarded:

- new claim pages 42, 44, 45, 47 which shall – without prejudice – replace previous claim pages 42, 44, 45, 47, and
- new description pages 5, 5a which shall replace previous description page 5.

On the new claim pages claims 6, 9 and 11 have been amended in view of the objections under clarity raised in section 3 of the Written Opinion. The method features of previous claims 9 and 11 have been transformed into apparatus features. The objected term of previous claim 6 has been replaced by "the format offset signatures". These objections should thus have become obsolete.

Bremen

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On the new description page an acknowledgement of documents D1 and D2 has been inserted.

It is refrained from transforming the independent claims into the two-part form since the two-part form would make it much more difficult to read and understand these claims. The features of these claims are currently listed in a sequential and logical order which would be destroyed if these claims were artificially separated in two parts. We thus kindly ask the Examiner to allow the one-part form in the present case.

All objections should now have been dealt with, and we kindly ask the Examiner to issue a positive International Preliminary Examination Report.



(Stephan Keck)
Association No. 15

Encls.:

New claim pages 42, 44, 45, 47
New description pages 5, 5a

at least one
element and the installed special package as recited in claim
at the intermediate network element.

6. The apparatus as recited in claims 1, 3, 4 or 5, wherein
the data format used to store the signatures of the
intermediate network elements as recited in claim 1, 2, 4, or 5
that a single or plural number of data packets flowing from one
endpoint to another traverses, containing / Comprises
- i. the identification of the ending point that the data packets
flow to,
 - 10 ii. the identification of the starting point that the data
packets flow from,
 - iii. the transmission protocol the data packets belongs to,
 - iv. the array of signatures of the intermediate network
elements in the order of the data packets traverse from
the intermediate network element where the data format
is stored to the ending point, and
 - v. the number of signatures of the intermediate network
elements in the order of the data packets traverse from
the intermediate network element where the data format
is stored to the ending point.

the at least one

iii. the identification of the collection of ~~single or plural~~
number of rules in a Rule Specification.

8. The apparatus as recited in any of the preceding claims,
~~12. A means of retrieving the collection of ~~single or plural~~~~

5 number of rules in a Rule Specification from the intermediate
network element ~~as recited in claim 1~~ that distributes the
collection of rules by the intermediate network element where
the collection of rules is distributed to, comprising

i. ~~the establishment of~~ a communication channel between

10 the intermediate network element where the collection
of rules is distributed to and the intermediate network
element where the collection of rules is distributed from,

~~means for providing~~
ii. ~~the provision of~~ the identification of the collection of rules

15 that is distributed ~~as recited in claim 11~~ via the
communications channel by the intermediate network
element where the collection of rules is distributed to,
and

~~means for transmitting~~
iii. ~~the transmission of~~ the collection of rules that is
distributed via the communications channel by the
intermediate network element where the collection of
rules is distributed from.

9. The apparatus as recited in any of the preceding claims,

~~13. A network control framework apparatus for controlling~~
~~resources at an intermediate network element connecting two or~~
~~wherein said communications networks comprise~~
~~more communications networks, wherein an endpoint node~~

- 45
- 48 <Wherein said communications
networks further comprise
means for setting up
referred to for
- hereafter known as a client node, sends a request to the other
endpoint node, hereafter referred to at least one intermediate network element, wherein plural number of the intermediaries, and the server node is adapted for accepting the request with an appropriate response, and a communications channel is set up between the server and the client node through the intermediaries, and the server node is adapted for transmitting data packets through the communications channel to the client node until the client node sends a request, via the intermediaries, to tear down the communications channel, and the client node may transmitting information about the transmission statistics back to the server node, comprises of the following entities:
- i. the gateway module providing gateway functionality,
 - ii. the rule engine module to perform network resource control decision based on specified rules, wherein the rules are specified in a rule specification format hereafter known as a Rule Specification,
 - iii. a single or plural number of special package add on to the rule engine module where a said special package offers specialized functionality to the rule engine module, and
 - iv. the rule injection module to inject or remove Rule Specification to or from the rule engine module.
10. The apparatus as recited in claim 9,
further comprising a
14. A means of providing the author of Rule Specification as
recited in claim 13 to trigger a singular or plurality of rules at a

<Comprising a control
means for using>

sent by the server node to the client node through the communications channel established between the server node and the client node after the elapse of a recurrent timer of a specified timer value;

- 5 11. The apparatus as recited in any of the preceding claims, wherein
- 15 12. A set of parameters ^{list} used in the Rule Specification ~~is~~ ^{at least one} recited in claim 1 to control ~~a single or plural number of~~ content or content delivery sessions to achieve device independence in the delivery of said content, ^{comprising} ~~consisting of~~
- 10. i. the set of User Preference parameters consisting of the preferences of the human user consuming the content,
- ii. the set of Agent Capabilities parameters consisting of the capabilities of the software agent employed by the human user to retrieve the content,
- 15. iii. the set of Device Capabilities parameters consisting of the capabilities of the hardware employed by the human user to retrieve the content, and
- iv. the set Natural Environment parameters consisting of the information about the environment in which the human user retrieves the content.
- 20. 12. The apparatus as recited in claim 73, wherein
- 15. 13. The set of User Preference parameters ~~is recited in claim~~ ¹⁵ consisting of comprises
- i. the human user's preferences on the method of retrieving the content,

The current use of intermediaries in content delivery is mostly restricted to providing simple functionality such as HTTP caching, HTTP proxy, or RTSP proxy. This cannot hope to maintain the service level demanded by the users of today's Internet; as the number of end-users increases exponentially. Moreover, with the range of hardware devices and software agents employed to retrieve contents by different users are also broadening, content providers are finding it difficult to present to the users a coherent set of contents are that suited to the user's device and preferences.

Though various international bodies have recognized the above problems, and have acted to provide resolutions, their work could still be improved on. The OPES framework described in focused on the operations of a single intermediary, ignoring the current trend of collaborations between content delivery networks. In addition, though the idea of the OPES framework is to perform content adaptation so as to enhance the user experience in content retrieval, it focused only on parameters of the HTTP. This is not only inadequate for device independence, it also does not cater to the growing number of audiovisual streaming applications.

Beck A. Hofmann, M.: "IRML: A Rule Specification Language for Intermediate Services; Version 02" IETF INTERNET DRAFT, [Online] 21 November 2001 (2001-11-21), pages 1-17 discloses web services as a new class of applications running on networked computers in a distributed environment. These services are invoked either directly by application end points or through intermediaries acting on behalf of application end points. Such intermediaries can appear in the form of caches, proxies, gateways, switches etc. and are also referred to as service dispatchers, application brokers, service brokers etc. IRML (Intermediary Rule Mark-up Language) is designed to serve as a simple and efficient, but yet powerful language to express the service execution policies of application end points. IRML rules are typically processed by intermediaries that trigger the execution of web services according to these rules and policies.

Srisuresh P et al : « Middlebox communication architecture and framework; » INTERNET ENGINEERING TASK FORCE, 28 February 2002 (2202-02-28), pages 1-35 discloses that there are a variety of intermediate devices in the internet today that require application intelligence for their operation. Diagrams pertaining to real-time streaming applications such as SIP and H. 323 and peer-to-peer application such as Napster and NetMeeting can not be identified by nearly examining packet headers.

Disclosure of Invention

To solve the problem listed in section 3.3, the present
25 invention allows content providers, access providers, and/or

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